

Log 2102



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: May 15, 1989

In reply refer to: A-89-27 through -30

Mr. Robert E. Whittington  
Acting Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

On January 15, 1988, a Cessna model 177RG airplane, N8052G, crashed at Camden, Arkansas, after its Textron Lycoming model IO-360-A1B6 engine stopped during cruise flight. The pilot attempted to land at the nearby Camden Municipal Airport, but the airplane struck trees just short of the airport during the forced descent. The airplane was destroyed and each of the four occupants aboard was seriously injured.<sup>1</sup>

The National Transportation Safety Board's investigation of the accident disclosed that all of the engine oil had been pumped overboard through a crack in the stainless steel propeller governor oil line, Lycoming part No. 75167. The oil line (flared tubing) attaches to elbow fittings at the front and rear right side of the engine and was cracked at the rear "B" nut ferrule. The designed installation of the line requires two rubberized isolation-type support members along its length to prevent excessive vibration and flexure: a clamp and a clip, Lycoming part Nos. LW-16266-25-38 and 75165, respectively. Neither of these critical parts, however, was attached to the failed line.

Since 1982, at least 16 other accidents and incidents (see attachments) have involved similar failures of the propeller governor oil line in airplanes powered by Lycoming 0-360 series engines. Most of the failures have occurred in Piper Models PA-28R-200 and PA-28R-180 airplanes and in Cessna model 177RG airplanes. Moreover, since 1983, 20 service difficulty reports (SDR) have been submitted to the Federal Aviation Administration (FAA) regarding propeller governor oil lines in Lycoming 0-360 series engines.

The engine manufacturer believes that most failures in propeller governor oil lines occur after maintenance personnel fail to reinstall the support clamps and clips following removal of the oil line for engine overhaul or for other reasons. At least 25 percent of the SDRs relating to such failures specifically indicate that the oil line support hardware was missing. The

<sup>1</sup> For more detailed information, read Field Accident Brief No. 524 (attached).

Safety Board concurs and believes that many of the failures may be attributed to high-cycle, low-stress metal fatigue. Failures may also result from overtorquing the aluminum "B" nuts on the oil line; bending or springing the rigid oil line during installation due to misalignment with the elbow fittings; or from damage to the oil line that may occur during improper installation of the alternator assembly--for example, crimping the line with a pry bar. As a result, the Safety Board believes that the FAA should require Lycoming to issue a service bulletin relating to installation of the propeller governor oil line assembly, emphasizing the importance of the support hardware, the proper alignment and torquing of the oil line assembly, and the need to exercise care to avoid damaging the oil line while installing the alternator assembly. Moreover, since many of the propeller governor oil lines on the 0-360 series engines may be improperly installed, the service bulletin should also include a procedure for inspecting these lines for cracks, abrasion, misalignment, overtorquing, and for ensuring that the proper support hardware has been installed. The FAA should issue an airworthiness directive (AD) requiring compliance with the installation provisions of the bulletin, as appropriate, and compliance with the inspection provisions at the next 100-hour or annual inspection, whichever occurs first.

On April 25, 1986, Textron Lycoming issued Service Instruction No. 1435, Part II: Propeller Governor Oil Line Nut and Elbow. The instruction stated:

As a product improvement, the propeller governor oil line now comes equipped with a steel connecting nut P/N AN818-6. This nut is a component of the tube assembly and has been changed from aluminum to steel without changing the tube assembly part number. Therefore, there are two ways to identify which nut you have; (1) aluminum nuts are anodized making them blue in color or (2) the use of a magnet to determine aluminum from steel. Also, the aluminum elbow at the front of the crankcase has been replaced by a steel elbow P/N MS20822-6.

Textron Lycoming Service Bulletin No. 240K, Replacement of Parts at Normal Overhaul, dated May 28, 1982, recommends that the aluminum elbows (part No. MS20822-6D) be replaced with the steel elbows at overhaul. The Safety Board concurs but also believes, because of the potential hazard of misaligning or overtorquing the nuts and elbows, that the aluminum nuts should also be replaced at overhaul. To minimize the occurrence of propeller governor oil line failures, the Safety Board believes that the FAA should issue an AD requiring installation of the steel components.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require Textron Lycoming to issue a service bulletin regarding inspection and installation of propeller governor oil lines. The bulletin should outline an inspection procedure to ensure that the oil line support hardware (clamps, clips, rubber hoses) is installed and to detect any cracking, abrasion, misalignment, or overtorquing of the oil line assembly. If any component is found cracked, overtorqued, or otherwise defective, or if the required oil line support hardware is not installed, the oil line assembly should be removed and replaced

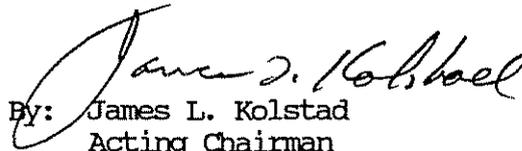
with a new assembly. An installation procedure should emphasize the importance of proper support, alignment, and torqueing of the oil line assembly; outline proper procedures necessary to avoid damaging the oil line while installing the alternator assembly; and require that all existing aluminum nuts and elbows used to attach the oil line to the engine be replaced with steel components. (Class II, Priority Action) (A-89-27)

Issue an airworthiness directive applicable to Textron Lycoming O-360 series engines with constant speed propellers requiring, at the next 100-hour or annual inspection, whichever occurs first, an inspection of the propeller governor oil line assembly in accordance with the Textron Lycoming service bulletin referred to in Safety Recommendation A-89-27. (Class II, Priority Action) (A-89-28)

Issue an airworthiness directive applicable to Textron Lycoming O-360 series engines with constant speed propellers requiring, at the next engine overhaul or anytime the propeller governor oil line is removed for any reason, the replacement of aluminum nuts and elbows, used to attach the propeller governor oil line to the engine, with steel components. (Class II, Priority Action) (A-89-29)

Publish a notice in the Federal Aviation Administration's Advisory Circular (AC) No. 43-16, General Aviation Airworthiness Alerts, concerning the proper installation and inspection of propeller governor oil line assemblies. The notice should: (a) cite examples of accidents and/or incidents resulting from improper installation or inspection of this assembly; (b) emphasize the importance of proper alignment and torqueing of the oil line assembly to prevent preloads or overstress; (c) emphasize the importance of protecting the oil line from damage during installation of the alternator assembly; and (d) stress the significance of attaching all required support clamps, clips, and hoses throughout the span of the oil line to avoid excessive vibration and flexure, and high-cycle, low-stress metal fatigue. (Class II, Priority Action) (A-89-30)

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in these recommendations.

  
By: James L. Kolstad  
Acting Chairman

Enclosures

Brief of Accident

File No. - 524      1/15/88      CAMDEN, AR      A/C Reg. No. N8052G      Time (Lcl) - 0115 CST

-----Basic Information-----

Type Operating Certificate-NONE (GENERAL AVIATION)

Type of Operation - PERSONAL  
Flight Conducted Under -14 CFR 91  
Accident Occurred During -DESCENT

Aircraft Damage  
DESTROYED  
Fire  
NONE

Injuries  
Fatal      Serious      Minor      None  
0          1          0          0  
Crew  
Pass      0          3          0          0

-----Aircraft Information-----

Make/Model - CESSNA 177RG  
Landing Gear - TRICYCLE-RETRACTABLE  
Max Gross Wt - 2800  
No. of Seats - 4

End Make/Model - LYCOMING IO-360-A1R6  
Number Engines - 1  
Engine Type - RECIP-FUEL INJECTED  
Rated Power - 200 HP

ELT Installed/Activated - YES/YES  
Stall Warning System - YES

-----Environment/Operations Information-----

Weather Data  
WX Briefings - NO RECORD OF BRIEFING  
Method - N/A  
Completeness - N/A  
Basic Weather - VMC  
Wind Dir/Speed- CALM  
Visibility - 10.0      SM  
Lowest Sky/Clouds - CLEAR  
Lowest Ceiling - NONE  
Obstructions to Vision- NONE  
Precipitation - NONE  
Condition of Light - DAYLIGHT

Itinerary  
Last Departure Point  
PINE BLUFF, AR  
Destination  
DERIDDER, LA

Airport Proximity  
OFF AIRPORT/STRIP

ATC/Airspace  
Type of Flight Plan - NONE  
Type of Clearance - VFR  
Type Anch/Lnds - STRAIGHT-IN  
FORCED LANDING

Airport Data  
CAMDEN  
Runway Ident - N/A  
Runway Lth/Wid - N/A  
Runway Surface - WATER  
Runway Status - WATER-CALM

-----Personnel Information-----

Pilot-In-Command  
Certificate(s)/Rating(s)  
PRIVATE  
SE LAND

Age - 48  
Biennial Flight Review  
Current - YES  
Months Since - 2  
Aircraft Type - UNK/NR

Medical Certificate - VALJR MEDICAL-WAIVERS/LIMIT  
Flight Time (Hours)  
Total - 396      Last 24 Hrs - 3  
Make/Model - 157      Last 30 Days - UNK/NR  
Instrument - 14      Last 90 Days - 30

Instrument Rating(s) - NONE

-----Narrative-----

THE PILOT REPORTED THAT HE LOST ALL ENGINE POWER DURING CRUISE. HE ATTEMPTED TO MAKE THE CAMDEN, ARKANSAS AIRPORT, THE AIRCRAFT DID NOT MAKE THE INTENDED LANDING AREA AND STRUCK A TREE AND SUBSEQUENTLY, A SWAMP AREA. THE ACCIDENT INVESTIGATION REVEALED NO AIRFRAME MALFUNCTIONS. AN ENGINE EXAMINATION DISCLOSED A CRACKED OIL LINE CONNECTING THE PROPELLER GOVERNOR TO THE ENGINE CASE. THE CRACKED LINE ALLOWED THE OIL SYSTEM TO BE DEPLETED OF OIL. THE ENGINE SEIZED AFTER THE NUMBER 3 PISTON FAILED. EXAMINATION OF THE CRACKED OIL PRESSURE LINE REVEALED THAT NEITHER OF THE TWO REQUIRED SECURING CLAMPS (INTENDED TO DAMPEN VIBRATION OF THE LINE) WERE PRESENT.

Brief of Accident (Continued)

File No. - 524 1/15/88 GARHBN,AR A/C Reg. No. N80526 Time (Lcl) - 0115 CST

Occurrence #1 LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/HALF  
Phase of Operation CRUISE - NORMAL

- Findings(s)
1. LUBRICATING SYSTEM,OIL LINE - CRACKED
  2. LUBRICATING SYSTEM,OIL LINE - NOT SECURED
  3. FLUID,OIL - EXHAUSTION
  4. ENGINE ASSEMBLY,PISTON - SEIZED

Occurrence #2 FORCED LANDING  
Phase of Operation DESCENT - EMERGENCY

Occurrence #3 IN FLIGHT COLLISION WITH OBJECT  
Phase of Operation APPROACH - VFR PATTERN - FINAL APPROACH

Findings(s)  
5. OBJECT - TREE(S)

Occurrence #4 IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation DESCENT - UNCONTROLLED

Findings(s)  
6. TERRAIN CONDITION - WATER

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 1,3,4

Factor(s) relating to this accident is/are finding(s) 2

ATTACHMENT

ACCIDENTS AND INCIDENTS INVOLVING BROKEN  
PROPELLER GOVERNOR OIL LINES IN TEXTRON LYCOMING  
O-360 SERIES AIRCRAFT ENGINES  
1982 THROUGH 1988

ACCIDENTS 1/

<u>Date</u>	<u>Location</u>	<u>Model</u>	<u>Registration</u>
07/09/82	Carrollton, GA	PA-28R-180	N7550J
09/03/82	Sewanee, TN	PA-28R-200	N4976S
12/30/82	Lumber City, GA	PA-28R-200	N2805R
04/10/85	Wabasso, FL	PA-28R-200	N2648R
11/21/85	Pekin, WI	GC-112	N1028R
03/17/86	Crossville, TN	PA-28R-180	N7613J
04/29/86	Placerville, CA	C-177RG	N34020
07/14/86	Marathon, FL	PA-28R-200	N9306N
05/17/87	Falmouth, MA	PA-28R-201	N30694
01/05/88	Camden, AR	C-177RG	N8052G

INCIDENTS 2/

<u>Date</u>	<u>Location</u>	<u>Model</u>	<u>Registration</u>
01/27/83	Indiana	LA-4	N1029L
09/01/83	California	PA-28R-200	N1092X
08/01/86	California	PA-28R-180	N4606J
08/11/86	Alabama	C-172	N5614R
02/18/87	South Dakota	M-20C	N6800U
09/14/87	Illinois	M-20C	N6497U
10/11/87	Colorado	C-177RG	N8218G

1/ Source: NTSB accident file.

2/ Source: FAA incident file.